

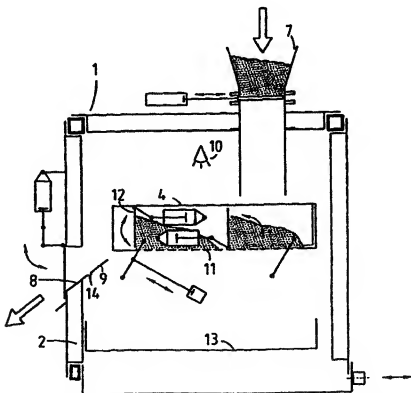


## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<b>(21) International Application Number:</b> PCT/NL97/00172 <b>(22) International Filing Date:</b> 8 April 1997 (08.04.97)  <b>(30) Priority Data:</b> 1002813                      9 April 1996 (09.04.96)                      NL  <b>(71) Applicant (for all designated States except US):</b> HOVERDALE N.V. [NL/NL]; Scharloeweg 55, Willemstad, Curaçao (AN).  <b>(72) Inventor; and</b> <b>(75) Inventor/Applicant (for US only):</b> HAMM, Paul, Lodewijk, Arie [NL/NL]; Parallelweg 72, NL-4283 GS Giessen (NL).  <b>(74) Agent:</b> VAN BREDA, Jacques; Octrooibureau Los en Stijger B.V., Weteringschans 96, NL-1017 XS Amsterdam (NL).	<b>(81) Designated States:</b> CA, NO, US, European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).  <b>Published</b> <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i> <i>In English translation (filed in Dutch).</i>	

**(54) Title:** OVEN AND METHOD FOR FINISHING A FOODSTUFF IN SUCH OVEN**(57) Abstract**

The invention relates to a method of finishing a food product in an oven (1), comprising heating the food product while said food product is kept in motion during heating. The motion is substantially chaotic. The food product is heated by means of a hot air flow generated in the oven, and in a first embodiment the movement of the food product is at least for a part determined by the hot air flow. In a second embodiment the food product is placed into a vibrating holder (4) which is provided in the oven (1).



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Oven and method for finishing a foodstuff in such oven

The invention relates to a method of finishing a food product in an oven, comprising heating the food product while said food product is kept in motion during heating. The invention further relates to an oven which is  
5 suitable for carrying out such a method and which comprises a housing and a heating element inside the housing for heating an air flow generated in the oven. The invention further relates to such an oven comprising also a holder for a food product to be heated in the oven,  
10 which holder is positioned in an air flow heated by the heating element.

Such a method and oven is known from US 5,315,919 and serves for the finishing, in particular for bringing precooked food products up to temperature for finishing  
15 them. A great variety of baking products can be prepared in such an oven. To name a few: French fries, croquettes, calamari, pork rind, etc.

The problem with the known method and oven is that when precooked food products are placed into the oven in  
20 (deep)frozen or congealed condition, the finished food product is not evenly heated through. With the known method and oven the danger exists that the outside of the food product becomes burnt, while the inside is still cold.

The object of the invention is to solve this  
25 problem and to achieve further advantages which will be elucidated below. To this end the method according to the invention is characterized in that during heating the food product or - in the case of French fries - its separate  
30 elements undergo a substantially chaotic motion in the oven. This can be realized in various ways. An oven suitable to carry out the method in accordance with the invention is characterized in that said oven is provided with a sloping spray plate in the heated air flow, having a plurality of orifices for the air flow. In this way the food  
35 product is kept in motion due to the interaction of forces exerted on the food product through the hot air flow on

the one hand and the gravitational force on the other hand. The oven which is provided with a holder for the food product to be heated in the oven is, in accordance with the invention, characterized in that means are  
5 provided for making the holder vibrate during operation.

The food product prepared in an oven and by a method in accordance with the invention, is shown to be heated through evenly, while surface burning of the food product is prevented altogether. Moreover, the method and  
10 oven in accordance with the invention offer the advantage that with precooked food products fat is separated from the food product, placing the prepared food product into the low-fat category, which is a positive contribution toward healthy eating.

To heat the food product the usual methods are contemplated, for instance by means of electricity, gas, or a combination of these. Taking into account the properties of the ready product, certain food products benefit from the hot air flow being generated by heating with steam,  
20 and subsequently heating the food product directly by means of an RF-source.

During the heating of the food product by the method according to the invention it is further desirable to complement the finishing of said food product by introducing additives into the oven atmosphere chosen from the  
25 groups of oils, fats, respectively salt, paprika, vinegar, chicken essence, herbs. In this very simple manner it is possible to bestow a desirable flavour on the food product, even on products where this is not possible by the conventional methods of preparation.

The oven which is provided with a holder for the food product to be heated in the oven is further characterized in that during operation of the oven, the holder substantially vibrates in vertical direction.

To optimally adapt to the food product to be treated in the oven, it is preferred that the amplitude and/or frequency of the vibration can be adjusted. In practice one should count on the holder having a frequency of between 500 and 850 strokes per minute. To heat a stan-

5 dard amount of French fries for one person the normal operating time of the oven is about 60 seconds. In the course of this time an air flow is generated in the oven of about 250°C, heating the food product contained in the holder.

For loading the oven and removing the ready food product, said oven is provided with a supply and discharge for the food product, which supply and discharge are linked with the holder.

10 It is particularly desirable that the discharge comprises a sloping guide face incorporating a drip slot extending over its width. This prevents fatty residue from leaving the oven together with the ready food product or dripping onto the ready food product when the discharge is  
15 activated. By employing the drip slot such fatty residue is separated from the ready food product so that it remains flawless and retains its thoroughly appetizing appearance.

In a particular embodiment of the oven according to  
20 the invention the house comprises a heat radiator, directed onto the holder from above. This allows a possibly desirable further colouring of the food product during preparation in the oven. As heat radiator an infrared source may be used, but a preferable heat  
25 radiator is an RF-source, especially if a steam injector is chosen as heating element for the air flow.

A preferred embodiment of the oven according to the invention is characterized in that the holder is movably attached to a frame mounted in the oven, being coupled to  
30 a drive by means of a connecting rod for making the holder vibrate. The frame should then be tiltable such that the holder can be moved between a substantially horizontal position and a position in which the bottom of the holder slopes in the direction of the discharge.

35 By tilting the frame, the holder can be tilted between the horizontal position, that is the preparation position of the food product contained therein, and the sloping position, that is the position in which the food product is moved to the discharge and out of the oven.

Advantageously the drive is then mounted onto the frame. In that way the construction for maintaining the holder's vibration requires no special adaptations.

It is further desirable that the holder, at the  
5 side of the discharge, is provided with a valve which, when the holder is in a predominantly horizontal position, closes said holder off and which valve opens the passage from the holder to the discharge when the frame is tilted.

In another preferred embodiment of the oven accord-  
10 ing to the invention the bottom of the holder is provided with drip openings for fat.

To allow this fat to be collected and possibly removed, a fat receptacle is provided in the housing under the holder. In this connection it is also advantageous  
15 that the drip slot is positioned above the receptacle.

This oven according to the invention provides the best results if the vibration of the holder continues at least while the heating element is heating the air flow.

Similarly, the passage of the food product after  
20 heating is promoted if the vibration of the holder continues while the frame is tilted.

The invention will now be further elucidated with reference to the drawing, in which

Fig. 1 shows a schematic cross-section of an  
25 embodiment of the oven according to the invention; and

Fig. 2 shows a schematic cross-sectional side view of the oven in accordance with Fig. 1.

The method according to the invention can be carried out with the oven shown in Figs. 1 and 2.

The oven 1 comprises a housing 2, and incorporated  
30 in the housing 2 a heating element 3, in the housing 2 a holder 4 is placed for a food product to be heated in the oven, and further a ventilator 5 maintaining an air flow in the oven indicated by arrows 6. The food product to be  
35 prepared, is placed in the holder 4 after which the oven 1 may be switched on and the ventilator 5 maintains an air flow 6 passing in succession a heating element 3, being subsequently directed to and through the holder 4 contain-  
ing the food product. While the food product is being

heated by the air flow 6, the holder 4 is kept vibrating by means provided in the oven which are suitable for this purpose. In a possible embodiment of the oven according to the invention (not shown), keeping the food product in chaotic motion is realized by means of providing instead of the vibrating holder a sloping spray plate in the heated air flow, having a plurality of orifices for the air flow. During operation, the air flow is directed upward through the orifices of the spray plate so that said air flow lifts the food product off the spray plate to a point when the air flow can no longer maintain this lifting effect and the food product rolls back along the spray plate and the movement of the food product may repeat itself. In the embodiment shown the chaotic motion of the food product is provided by the vibration of the holder. These vibrations are carried out substantially in vertical direction and it is useful if the amplitude and/or the frequency of the vibrations is adjustable. In this way it is possible to suitably adapt to the kind of food product and the duration of heating in the oven.

The housing 2 of the oven is further provided with a supply 7 and discharge 8 for the food product, both of which are linked with the holder 4. The discharge 8 comprises a sloping guide face 9 incorporating a drip slot (not shown) extending over the width of the guide face 9. When the food product leaves the oven via the discharge 8, accompanying fat is effectively separated from the food product 8, which prevents that any fat will keep dripping onto the food product.

The oven 1 also comprises a heat radiator 10 which is directed from above onto the holder 4 and which provides extra heating for the food product contained in the holder 4 in order to give it a desirable colour. The heat radiator 10 is preferably an RF-source, especially if the heating element 3 for the air flow 6 takes the form of a steam injector. The holder 4 is attached to a frame mounted in the oven and coupled to a drive by means of a connecting rod for making the holder 4 vibrate. This is not shown in the Figures. Said frame is preferably

tiltable such that the holder 4 is movable between a substantially horizontal position, this is shown, and a position in which the bottom 11 of the holder 4 slopes in the direction of the discharge 8. The drive for making the holder 4 vibrate is preferably also mounted on the frame.

Further a valve 12 is provided for the holder 4 which valve is positioned at the side of the discharge 8 and which, when the holder is in a horizontal position, closes said holder off while opening the passage from the holder 4 to the discharge 8 when the frame and the holder 4 mounted thereon is tilted. The bottom 11 of the holder 4 is preferably provided with drip openings for fat. This fat is collected in a fat receptacle 13 provided at the bottom of the housing 2 of the oven 1. The drip slot 14 provided in the guide face 9 of the discharge 8 is also positioned above this receptacle 13. During operation of the oven, the vibrations of the holder 4 continue at least while the heating element 3 is heating the air flow 6. Similarly, in order to facilitate discharge of the food product from the holder 4 for passage from the oven 1, said vibration is preferably continued while the frame and the holder 4 mounted thereon are tilted.

It will be clear to the person skilled in the art that within the scope of protection of the appended claims a variety of embodiments of the oven are possible, and that the above description merely relates to one possible embodiment.



CLAIMS

1. A method of finishing a food product in an oven, comprising heating the food product while said food product is kept in motion during heating, characterized in that the motion is substantially chaotic.

5 2. A method according to claim 1, characterized in that the food product is heated by means of a hot air flow generated in the oven, and that the movement is at least for a part determined by the hot air flow.

3. A method according to claim 1 or 2,  
10 characterized in that the hot air flow is generated by heating with steam, and that the food product is further heated by means of an RF-source.

4. A method according to one of the claims 1 to 3, characterized in that during the heating of the food product additives are introduced into the oven atmosphere  
15 chosen from the groups of oils, fats, respectively salt, paprika, vinegar, chicken essence, herbs.

5. An oven suitable for applying the method according to one of the claims 1 to 4, comprising a housing, and  
20 a heating element inside the housing for heating an air flow generated in the oven, characterized in that there is a sloping spray plate positioned in the heated air flow, having a plurality of orifices for the air flow.

6. An oven suitable for applying the method according to one of the claims 1-4, comprising a housing and a heating element inside the housing and placed in the housing, a holder for a food product to be heated in the oven, which holder is positioned in an air flow heated by the heating element, characterized in that means are provided  
25 for making the holder vibrate while the oven is in operation.

7. An oven according to claim 6, characterized in that while the oven is in operation, the holder vibrates substantially in vertical direction.

8. An oven according to claim 6 or 7, characterized in that the amplitude and/or frequency of the vibration can be adjusted.

9. An oven according to one of the claims 6 to 8,  
5 characterized in that said oven is provided with a supply and discharge for the food product, which supply and discharge are linked with the holder.

10. An oven according to one of the preceding claims, characterized in that the discharge comprises a sloping guide face incorporating a drip slot extending over its width.

11. An oven according to one of the claims 6 to 10, characterized in that the house comprises a heat radiator, directed onto the holder from above.

12. An oven according to claim 7 and 11, characterized in that the heat radiator is an RF-source and that the heating element is a steam injector.

13. An oven according to one of the claims 6 to 12, characterized in that the holder is movably attached to a  
20 frame mounted in the oven, being coupled to a drive by means of a connecting rod for making the holder vibrate.

14. An oven according to claim 13, characterized in that the frame is tiltable such that the holder can be moved between a substantially horizontal position and a  
25 position in which the bottom of the holder slopes in the direction of the discharge.

15. An oven according to claim 13 or 14, characterized in that the drive is mounted on the frame.

16. An oven according to claim 14 or 15, characterized  
30 in that the holder, at the side of the discharge, is provided with a valve which, when the holder is in a predominantly horizontal position, closes said holder off and which valve opens the passage from the holder to the discharge when the frame is tilted.

17. An oven according to one of the claims 6 to 16,  
35 characterized in that the bottom of the holder is provided with drip openings for fat.

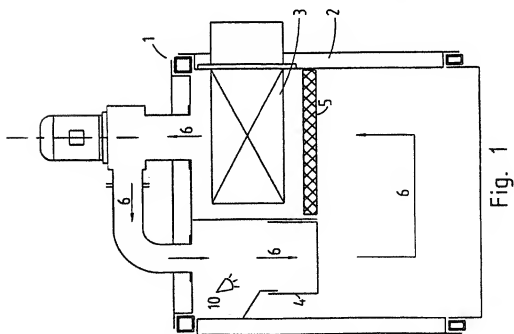


Fig. 1

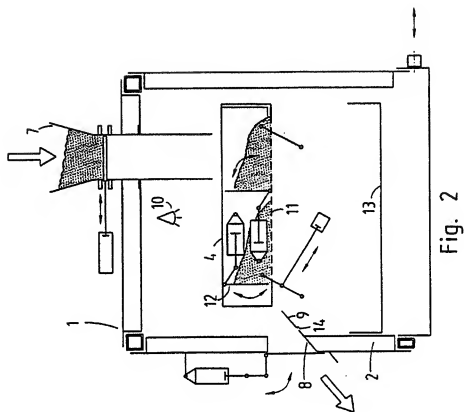


Fig. 2

18. An oven according to one of the claims 6 to 17, characterized in that a fat receptacle is provided in the housing under the holder.

19. An oven according to one of the claims 10 to 18, characterized in that the drip slot is positioned above the receptacle.

20. An oven according to one of the claims 6 to 19, characterized in that the vibration of the holder continues at least while the heating element is heating the air flow.

21. An oven according to one of the claims 13 to 20, characterized in that the vibration of the holder continues while the frame is tilted.

## INTERNATIONAL SEARCH REPORT

International Application No

PCT/NL 97/00172

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 A47J37/12 A47J37/04

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 A47J

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 636 334 A (ETABLISSEMENTS R.KOHL) 1 February 1995  see column 2, line 50 - column 6, line 36; figures 2,5,6,8	1,2, 6-11,13, 15,20,21
A	---	3,12
X	EP 0 379 755 A (HOBART CORPORATION) 1 August 1990  see column 5, line 56 - column 12, line 37; figures 3,5-7,12,13	1
A	---	5
X	US 5 445 073 A (GILWOOD) 29 August 1995  see column 4, line 17 - column 6, line 44; figures  --- -/--	1,2,5

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

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# INTERNATIONAL SEARCH REPORT

International Application No  
PCT/NL 97/00172

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	---	11,12
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A	---	9,11, 13-15
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